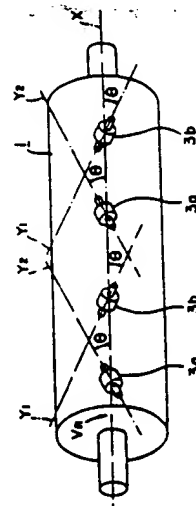


(54) ROTARY BODY GRINDING DEVICE

- (11) 61-164772 (A) (43) 25.7.1986 (19) JP
 (21) Appl. No. 60-2181 (22) 11.1.1985
 (71) MITSUBISHI HEAVY IND LTD(1) (72) KANJI HAYASHI(4)
 (51) Int. Cl. B24B5/37, B21B28/04

PURPOSE: To enable uniform grinding of the whole surface of a rotary body by inclining the rotary axes of adjacent grinding bodies mutually in the opposite direction with respect to the axis of a rotary body to be machined.

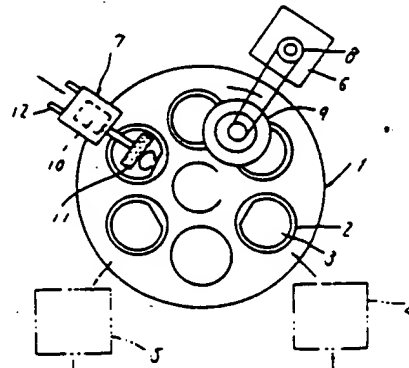
CONSTITUTION: When grinding wheels 3a, 3b are pressed to the surface of a rotating roll 2, the wheels 3a, 3b are rotated followingly due to the frictional force between them. The rotary axes of the wheels 3a, 3b are inclined at a required angle to the rotary axis of the roll 1, causing the wheels 3a, 3b to rotate relatively at their contact surfaces with the roll 1. The directions of the relative slide of the mutually adjacent wheels 3a, 3b are opposite to each other, and the wheel 3a carries out grinding with its right side up while the wheel 3b with its right side down. Thus, the grinding is carried out in two directions without being one-sided, thereby grinding the whole surface of the roll 1 uniformly.

**(54) METHOD AND DEVICE FOR GRINDING WAFER**

- (11) 61-164773 (A) (43) 25.7.1986 (19) JP
 (21) Appl. No. 60-5700 (22) 18.1.1985
 (71) HITACHI LTD (72) TAKASHI SHIMURA(3)
 (51) Int. Cl. B24B7/22, H01L21/304

PURPOSE: To machine the surface of a wafer with high accuracy by finishingly grinding the surface of said wafer after carrying out rough grinding.

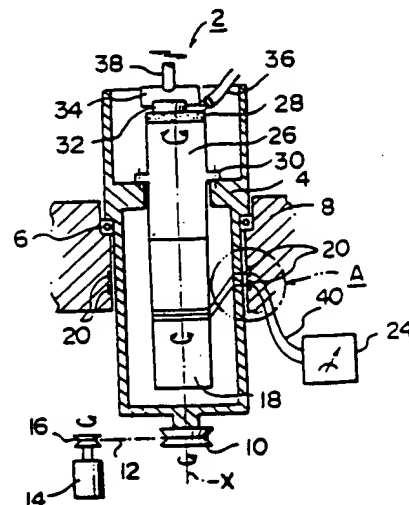
CONSTITUTION: After wafers 3 are delivered in order from a loader 4 onto the wafer chuck table 2 on a defined position of a rotary table 1 by means of a delivery mechanism, the wafer 3 is fixed and held with its circuit-formed surface faced up, on this table 2 by means of vacuum adsorption. The wafer 3 thus fixed and held is subjected to rough grinding by means of a cup wheel 9 of a rough grinding mechanism 6 while the rotary table 1 is rotated at a certain angle. Then, by further rotating the rotary table 1 at a certain angle, the wafer 3 is subjected to a plane surface grinding accurately by means of a straight grinding stone 11 during this rotation.

**(54) VIBRATION POLISHING MACHINE**

- (11) 61-164774 (A) (43) 25.7.1986 (19) JP
 (21) Appl. No. 60-860 (22) 9.1.1985
 (71) CANON INC (72) TORU IMANARI
 (51) Int. Cl. B24B13/02

PURPOSE: To carry out polishing with high accuracy and favorably in a short time by providing a means of vibrating a polishing plate at a high vibrating frequency with a small amplitude and making the tracks of movement of abrasive grains with respect to a workpiece during a unit time complex and longer.

CONSTITUTION: The switch of an ultrasonic vibration generating device 24 is turned on, to make a vibrator 18 torsionally vibrate around an axis X with a minute amplitude, via a cord 40, a slip ring 20, etc. This torsional vibration is transmitted to a polishing plate 28 through a vibration transmitting horn 26, equally to make the end of the polishing plate 28 torsionally vibrate around the axis X with a minute amplitude of few microns. After rotating a rotary body 4 by driving a motor 14 under this condition, a plate glass (workpiece) 32 is pressed with a holder 34 and a supporting means 38 to be pushed against the polishing plate 28 from a feeding pipe 26, to polish this plate glass 32 with the abrasive grains on the polishing plate 28 under ultrasonic vibration.

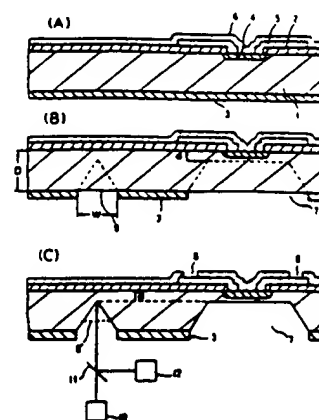


(54) MANUFACTURE OF SEMICONDUCTOR DEVICE

(11) 62-283678 (A) (43) 9.12.1987 (19) JP
 (21) Appl. No. 61-125655 (22) 2.6.1986
 (71) NISSAN MOTOR CO LTD (72) HIDETOMO NOJIRI
 (51) Int. Cl. H01L29/84, H01L21/306

PURPOSE: To accurately and easily form the necessary thickness of a thin film in case of etching by simultaneously etching predetermined parts except a thin film structure of a semiconductor substrate, emitting a light to the predetermined part during etching to detect the depth of etching, thereby controlling the etching.

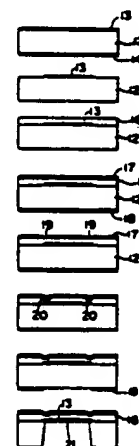
CONSTITUTION: Silicon oxide films 2, 3 are formed on upper and lower surfaces of an N-type Si semiconductor substrate 1, and a P-type diffused resistance region 4, an aluminum wiring layer 5 and a PSG film 6 are formed. Then, a diaphragm 7 and the film 3 of an etching end point detecting region 9 are removed by photoetching, with the film 6 as a mask it is etched. A light is emitted perpendicularly from a light source 10 through an optical system 11 to the region 9 during the etching, and the reflected light is detected by a photodetector 12. An etchant uses a crystal surface selective etchant. Accordingly, the reflected light is generated with respect to an incident direction while the surface perpendicular to the incident direction of the light as designated by a broken line 9' remains on the way of etching, but when a V-shaped groove is completed, the reflection of the incident direction becomes almost naught.

**(54) MANUFACTURE OF SEMICONDUCTOR PRESSURE SENSOR**

(11) 62-283679 (A) (43) 9.12.1987 (19) JP
 (21) Appl. No. 61-127723 (22) 2.6.1986
 (71) FUJIKURA LTD (72) HIROKAZU HASHIMOTO
 (51) Int. Cl. H01L29/84, H01L21/306

PURPOSE: To reduce the irregularity of the thickness of a diaphragm by growing a semiconductor layer on a semiconductor substrate on which an etching stop layer is formed on a predetermined region, forming a gauge resistor on the layer, and etching from the lower surface of the substrate to the stop layer.

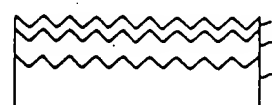
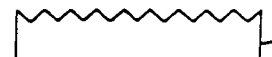
CONSTITUTION: SiO₂ films 13, 14 are formed on the upper and lower surfaces of an N-type silicon wafer 12, and an SiO₂ film 13 remains in a circular shape at the center on the upper surface of a photolithography. Then, an N-type silicon is epitaxially grown on the upper surface of a wafer to form a semiconductor layer 16. Then, SiO₂ films 17, 18 are formed on the upper and lower surfaces of the wafer, and a diffusing window 19 is formed at the film 17 by photolithography. Then, the wafer is disposed in a diffusing furnace, boron is supplied, and a gauge resistor 20 is formed. Thereafter, the center of the film 18 on the lower surface of the substrate 1 is removed by photolithography. Then, the wafer is etched from the lower surface with an etchant to form a diaphragm 21.

**(54) SEMICONDUCTOR DEVICE**

(11) 62-283680 (A) (43) 9.12.1987 (19) JP
 (21) Appl. No. 61-126507 (22) 31.5.1986
 (71) MITSUBISHI ELECTRIC CORP (72) KAZUO MIZUGUCHI
 (51) Int. Cl. H01L31/04

PURPOSE: To effectively reduce the reflection coefficient of a semiconductor device by utilizing a multiple reflections by forming a texture structure on a single crystal silicon substrate, and forming an active layer made of compound semiconductor thereon, thereby forming the upper layer of the active layer as an active layer of high quality.

CONSTITUTION: A texture (pyramidlike uneven surface) structure is formed on a single crystal Si (100) substrate 1. The substrate 1 is treated with an aqueous solution of 60% hydrazine (N₂H₄), and the texture structure is obtained even by treating with an aqueous solution of 1% NaOH. After an active layer 2 of compound semiconductor, such as GaAs thin film is epitaxially grown, for example, by an MOCVD method (vapor growth using organic metal) by the substrate 1, a reflection preventive film 3 and electrodes are formed.

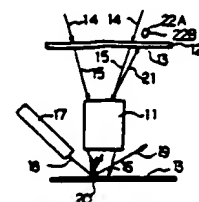
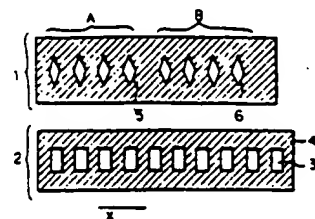


(54) ALIGNMENT SYSTEM

- (11) 62-190726 (A) (43) 20.8.1987 (19) JP
 (21) Appl. No. 61-32379 (22) 17.2.1986
 (71) TOKYO ELECTRON LTD (72) HIROSHI UEHARA
 (51) Int. Cl.¹ H01L21/30, G03F9/00, H01L21/68

PURPOSE: To align masks and wafers at a high speed by forming the shape of repetition unit which forms a repetition pattern sequentially in narrower width toward both ends with the center of arranging direction in widest.

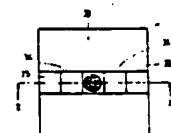
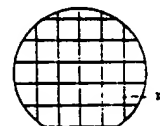
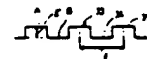
CONSTITUTION: The intervals of repetition patterns 1 on a mask and repetition patterns 2 on a wafer are equal. Rhombic window 5, 6 for passing many lights and nontransmission portions are formed at the same interval on the pattern 1 on the mask, and formed by displacing the phases by 1/2 pitch on the portions A, B. The lights emitted from the reflected portion 3 of the pattern 2 on the wafer pass the windows 5, 6 on the mask, the lights passed through the window 5 are detected by a detector 22A, and the light passed through the window 6 are detected by a detector 22B. The pattern 1 on the mask 12 completely coincides in range of the portion A with the pattern 2 on the wafer 13, and is displaced on the portion B. Thus, the output of the detector 22A becomes maximum, and the output of the detector 22B becomes minimum. Thus, since the variation in the potential increases with respect to the relative movements of the mask and the wafer near the "0" potential, they can be aligned accurately at high speed.

**(54) TREATMENT OF SEMICONDUCTOR WAFER**

- (11) 62-190727 (A) (43) 20.8.1987 (19) JP
 (21) Appl. No. 61-33233 (22) 17.2.1986
 (71) FUJITSU LTD (72) KENJI SUGISHIMA(1)
 (51) Int. Cl.¹ H01L21/30, G03F9/00, H01L21/68

PURPOSE: To accurately align masks by forming the surface of a semiconductor chip disposed under a Fresnel zone target formed on the mask in a projection or a recess.

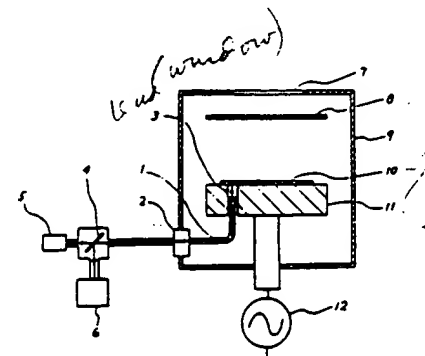
CONSTITUTION: The alignment mark 33 of a Fresnel zone target is formed in a predetermined semiconductor chip 32 formed by a scribing line 31. Recess regions 34 and projection regions 35 are repeatedly formed at a pitch l , for example, of $5\mu\text{m}$ on the periphery of the mark 33. When the size l' from the surface A of the region 34 to the surface B of the region 35 becomes $1/4 \lambda$, where λ is the wavelength of alignment light. Thus, since the light arrived at the surface of a semiconductor wafer 1 through the surface of the mask 2 and reflected on the surface does not partly coincide with the light reflected on the surface of the mask, they do not extremely strengthen nor weaken each other. Therefore, a difficulty of the erasure of the spot of the Fresnel zone target on the mask can be avoided.

**(54) METHOD AND APPARATUS FOR MONITORING ETCHING END POINT**

- (11) 62-190728 (A) (43) 20.8.1987 (19) JP
 (21) Appl. No. 61-31783 (22) 18.2.1986
 (71) NIPPON TELEGR & TELEPH CORP <NTT>
 (72) SHIGEYUKI TSURUMI(3)
 (51) Int. Cl.¹ H01L21/302, C23F1/00, C23F4/00

PURPOSE: To eliminate the influence of contamination of a substance to be etched by introducing an infrared light of a predetermined wavelength to the surface of a semiconductor substrate of the side not formed with a thin metal film of the surface of the substrate, measuring the intensity of the light reflected on the thin film through the substrate of the infrared light, and obtaining the etching end point by the intensity of the reflected light to readily position a detector, thereby improving S/N ratio.

CONSTITUTION: The infrared light of $1.3\mu\text{m}$ of wavelength modulated by a sinusoidal wave of 1kHz from an infrared light emitting unit 5 is passed through a half mirror 4 to an optical fiber 1, and emitted to a silicon substrate 10 formed with the thin metal film as parallel beam via a rod lens 3. Part of the infrared light of $1.3\mu\text{m}$ of wavelength is reflected on the back surface of the substrate 10, but is passed through the Si, reflected on the metal film surface, again through the lens 3, and returned to the optical fiber 1. The returned infrared light is reflected on the half mirror 4, and detected by an infrared light detector 6. When the metal film is etched and removed by the plasma, the reflected light is erased from the metal film, thereby notifying the etching end point.



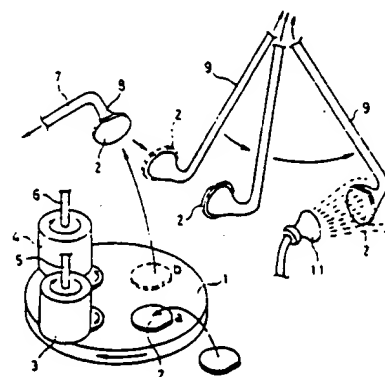
7: window, 8: upper electrode, 9: vacuum tank, 11: lower electrode, 12: RF power source

(54) METHOD FOR GRINDING SEMICONDUCTOR WAFER

(11) 63-256342 (A) (43) 24.10.1988 (19) JP
 (21) Appl. No. 62-88202 (22) 10.4.1987
 (71) SUMITOMO ELECTRIC IND LTD (72) NOBORU GOTO(1)
 (51) Int. Cl. B24B1/00, H01L21/304, H01L21/306//B24B7/20, B24B37/00

PURPOSE: To eliminate difficulties in handling of semiconductor wafer by shifting a ground semiconductor wafer to an attraction pad, spraying the grinding surface with an etching liquid like a shower for grinding and cleaning said surface after removing working affected layers.

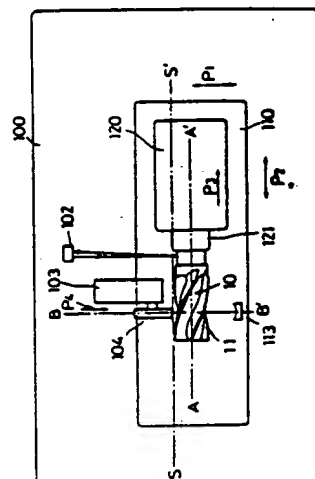
CONSTITUTION: A ground semiconductor wafer 2 is transferred from a table 1 to a first attraction pad 8 and from said pad 8 to a second attraction pad 10 without any difficulties on handling. Then, for example while shower-like etching liquid from a nozzle 11 removes completely and surely working affected layers, ground chips caused by grinding wheel are removed. Thus, the semiconductor wafer 2 is not cracked during the etching.

**(54) TOOL POLISHER**

(11) 63-256343 (A) (43) 24.10.1988 (19) JP
 (21) Appl. No. 62-91329 (22) 14.4.1987
 (71) HIROMI TAKENOUCI(2) (72) TSUNEO IGARASHI
 (51) Int. Cl. B24B3/24, B24B3/18, B24B49/12

PURPOSE: To repolish a tool simply in a short time by controlling the movement of a movable bed such that a light sensor means always receives laser beam reflected from the blade surface of tool as it rotates.

CONSTITUTION: A blade surface tracking sensor 113 is provided with a laser diode for projecting laser beam having proper frequency to the peripheral surface of a tool 10 to be ground and two light sensors for receiving laser beam reflected from the peripheral surface. And as the said tool 10 is rotated, the forward and backward movement of a movable holding bed 120 is controlled such that the laser beam diffused and reflected from the blade surface 11 is projected to two light sensors simultaneously. A grinder 104 is operated to polish the corresponding position at the opposite side to said tool 10 with polishing surfaces S-S'. Thus, the movable holding bed 120 is moved according to the indication from the blade surface tracking sensor 113 so that said bed 120 can accurately automatically repolish the blade surface 11 without getting out of the blade surface 11 of said tool 10.

**(54) FLY EDGE POLISHING METHOD**

(11) 63-256344 (A) (43) 24.10.1988 (19) JP
 (21) Appl. No. 62-91012 (22) 15.4.1987
 (71) HITACHI LTD (72) MASAMI MASUDA(1)
 (51) Int. Cl. B24B3/34

PURPOSE: To easily polish a fly edge with high accuracy without any influence of mounting error of fly edge, by holding the fly edge similarly to that in cut working, rotating it in the opposite direction to that of working and polishing the fly edge with the land portion being pressed against a grinding wheel.

CONSTITUTION: A fly edge 2 is clamped by a tool holder 3 which is chucked by a chuck 4 of a spindle 5 of a working machine like a milling machine for preparatory plan, and a grinding wheel 5 is mounted on a table 6 of working machine. And the fly edge 2 is adapted to contact the grinding wheel 5 to be polished by the reverse rotation to the normal usage condition. Since the fly edge 2 in polishing is held similarly to that in the normal cut working and rotated in the opposite direction to same, the land 2b can be polished easily and accurately without any effects of mounting error of fly edge 2. As a result the fly edge bears accurately against the surface of a material to be ground to prevent it from the degradation of surface roughness.

